EFFECT OF DIFFERENT VISUAL TRAINING PROGRAMMES ON SELECTIVE COORDINATIVE ABILITY IN MALE HOCKEY PLAYERS

SHORT SYNOPSIS

Submitted in partial fulfillment of the requirement of the degree of

DOCTOR OF PHILOSOPHY

to

Lakshmibai National Institute of Physical Education, Gwalior

by

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CERTIFICATE

I hereby declare that the short synopsis **"EFFECT OF DIFFERENT VISUAL TRAINING PROGRAMMES ON SELECTIVE COORDINATIVE ABILITY IN MALE HOCKEY PLAYERS"** being submitted in partial fulfillment of the requirement for the degree of Doctor of Philosophy in Physical Education under Department of Health Sciences of Lakshmibai National Institute of Physical Education, Gwalior during the academic year 2022-2023.

It is a bonafide record of original work carried out under the supervision of Dr. Brij Kishore Prasad and has not been submitted in full or part to any other university or institute for a degree or diploma.

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ABSTRACT

The purpose of this study is to investigate how various visual methods of training affect male hockey players' selected coordination abilities. In competitive team sports, especially hockey players must make quick decisions and perform accurate motor reactions in dynamic and visually challenging environments. A total of 80 male hockey players, aged 16 to 25 years and with at least three years of playing experience, will be purposively selected and randomly allocated into four equal groups: 1. Field-Based Visual Training Group, 2. Lab-Based Visual Training Group, 3. Combined Field and Lab-Based Training Group, and 4. Control Group (no intervention). The intervention will occur over 12 weeks, during which customised visual training modules for each group's context will be executed. Standardised instruments will be employed for pre- and post-intervention evaluations to evaluate five critical variables: hand-eye coordination, foot-eye coordination, visual reaction time, peripheral awareness and time-movement anticipation.

The research used a pre-test–post-test experimental design, with the gathered data subjected to statistical analysis via Univariate Analysis of Covariance (ANCOVA) to account for baseline disparities and assess the efficacy of each training method. It is predicted that as compared to the control group, individuals in the visual training groups—particularly those undergoing combined field and lab-based training—will demonstrate notable gains in the chosen coordinative abilities.

The expected result of this research is to furnish empirical evidence endorsing the incorporation of visual training into standard athletic practice regimens. This research aims to enhance the formulation of comprehensive and scientifically substantiated training methodologies in hockey. Furthermore, the results are anticipated to possess broader relevance across other sports disciplines that require swift visual processing, motor coordination, and tactical execution. The study seeks to integrate perceptual-cognitive training with traditional physical education methods, thereby fostering a comprehensive approach to athlete development and performance improvement.

Keywords

Visual training, Coordinative abilities, Eye-hand coordination, Eye-foot coordination, Visual reaction time, Peripheral awareness, Time-movement anticipation.

1. INTRODUCTION

Sports have long occupied a unique position in human civilization, bridging, divides and bringing people together through a universal language of athleticism. From antiquity to the present, sports have been essential in forming societies, encouraging friendship, and displaying the unwavering spirituality of human achievement. From team-based competitions such as basketball, hockey, football, and crickets to individual hobbies such as table tennis, tennis, athletics, swimming, etc., sports cover a broad spectrum of activities. Every sport has one thing in common: the quest for perfection through mental clarity, physical skill, and strategic thought. Participating in sports helps people in numerous ways, such as increased mental and physical quickness, self-control, teamwork, and feelings of accomplishment. Sports may bring people from diverse origins and cultures together to overcome social barriers.

Hockey is a physically demanding, fast-paced team sport that necessitates a distinctive combination of technical skill, endurance, agility, speed, and strength. The game, which is played on turf or grass, requires players to maintain control of the stick and ball while performing rapid movements in high-pressure situations. Hockey necessitates sophisticated cognitive and perceptual abilities, including spatial awareness, anticipatory skills, visual tracking, and quick decision-making, because of its dynamic nature(*Field Hockey: Steps to Success*). Physical fitness is not the solitary determinant of hockey success; rather, it is contingent upon the player's ability to effectively perceive and respond to continually evolving game scenarios. Consequently, training programs that improve visual-motor coordination are becoming increasingly acknowledged as essential components of enhancing their performance in the sport.(Van Gemmert & Teulings, 2006).

Coordinative abilities are essential for the consistent and well-coordinated formation of the overall movement from fragmentary movement. A sportsperson can attain the maximum level of general motor skills when their movements are well-coordinated. coordination is necessary for the execution of motor skills in various games and sports, as they are considered general motor and psychological conditions for performance accomplishment. This enables an individual to regulate their motor performance in all sports activities. The coordination abilities of the athlete facilitate their movements, resulting in a more favourable outcome. These are indispensable for the most effective utilisation of conditional abilities, strategic plans, and skills.

Coordination is the capacity to execute a sequence of movements often, with precision and efficiency, without the need for an awkward posture. This may encompass the movement of joints, muscular

contractions, and the senses. It is necessary to possess the capacity to coordinate the movements of various body parts to achieve success in a variety of field events, from straightforward jogging to more challenging high jump movements.

According to (Uppal, 2021)"Coordinative abilities have a direct relevance to performance to sports performance. It is emphasized that, the Performance in different sports relies on the level of coordinative abilities of an individual & the coordinative abilities depend upon the mechanism involve in the control and regulation of movement, the coordinative process of nervous system & efficiency of various sense organs."

Visual training has become an essential element for athletes seeking to gain a competitive advantage in the contemporary era of sports science and performance enhancement. Integrating visual skills into training regimens has been demonstrated to substantially improve athletic performance in a variety of sports, according to the research. However, the use of visual training in field hockey, particularly among male participants, remains understudied. It is about learning how to make the most of your visual system during events where vision directs body movement across space and with respect to other stationary and moving objects. It is about understanding how to consume and handle more information quicker, and about sensing and adapting to transition at speed to move quickly and more reliably.

Athletes use vision as a signal to tell their bodies when to work out and to guide their responses. The output degrades if signals are not received by the visual system accurately or promptly. Given that competition in sports can be one of the most taxing activities in the visual system, it is imperative that visual systems function at advanced levels (Khanal, 2015).

This study aimed to address this imbalance by examining the impact of various visual training programs on the coordination abilities that are essential for field hockey. The capacity to effectively interpret visual stimuli is a critical factor in sports performance despite the well-documented physical benefits of conventional training programs.

As (Appelbaum et al., 2016) observed, athletes can gain a significant advantage during gameplay by enhancing their visual and cognitive skills, which can improve both technical execution and decision-making. This study emphasises the importance of visual perceptual skills in achieving optimal performance by concentrating on hockey players, a sport that requires high-speed reactions and precise coordination. The study also addressed the absence of structured visual training protocols in sports

education and instruction. It offers practical insights for physical educators and instructors by investigating visual training programs based in the laboratory and in the field. The findings may serve as inspiration for the creation of scientifically designed training modules that integrate cognitive and physical development, thereby guaranteeing a comprehensive approach to athlete preparation, as the results could facilitate a more effective integration of visual and physical training.

2. LITERATURE REVIEW

Clark et al., (2012) research study was based on vision training for higher performance. Batting statistics was selected as a dependent variable. This study was implemented on University of Cincinnati Baseball Players. All the players for 2010 to 2011 season of this university went through preseason physicals and baseline testing standard of the university. Standard vision training exercises was given before 6 weeks of the actual season. The findings of the study were compared with the results of the 2009 to 2010 season. Preseason training plan includes conditioning and followed by training of vision throughout the programme. Batting average of the University of Cincinnati team increased from 0.251 in 2010 to 0.285 in 2011 and the slugging percentage improved by 0.033. Big East's universities slugging percentage fell over 0.082 in same time frame. These findings produce 0.115 difference with 95% confidence interval (0.024, 0.206). A significant difference (p=.02) was found between Cincinnati university and other Big East universities in batting average. In all batting parameters 10% and more improvement was found and in game playing similar difference was found with the Big East conference. Vision training which a combination of traditional and technological methodologies is helps in train athlete eyes and ultimately in improving batting performance. Basically, as a part of conditioning or either for injury prevention, vision training can be added in training schedule, which may be beneficial for batting performance of college level baseball players. This study concludes that High performance vision training can be implemented in the pre-season and maintained throughout the actual training season to improve batting parameters.

Rezaee et al., (2012) conducted a research study, which was aimed to investigate the impact of visual and athletic skills training plan on sports performance enhancement. The training plan was scheduled for 8 weeks. For effective implementation of the study novice basketballers and table tennis

players were selected. Further a total of sixty (60) male players were randomly divided into six equal groups, G-1 (basketball lay-up and visual training), G-2 (forehand drive table tennis and visual training), G-3 (lay-up training of basketball), G-4 (table tennis forehand drive), G-5 (visual training) and G-6 (control). Revien and Gabor (1981) visual training and athletic skill drills were used as a training plan in this study. Pre (0 week) and post (after 8 week) test of six different type of visual skills and athletic training test was conducted. The findings of the study reveal the impact of training plan, as training groups found enhancement in their visual skills and athletic skills. Visual and table tennis group showed better performance if compares with visual and basketball group. Combination of athletic and visual skills was above than visual and exclusive athletic training. The study concludes that different skills of sport and their visual demands can affect the visual training plan.

Hands et al., (2013) investigated for success of auditory human-machine interface through augmentative visual training. For this, total sixteen (16) participant with no medical history of any diseases were selected. For achieving two-dimensional modulation of vowel aims bilateral facial surface electromyography was used in the investigation. Treatment of Auditory input and mixed visual received by Eight (8) participants, while only real-time auditory feedback treatment received by other eight (8) participant. Three days in a week, each participant follows four sessions: three with their own choice i.e. input modality (auditory with supplementary or auditory alone) and a fourth session consist of novel vowel aims to assess auditory-motor learning generalization. An analysis of variation was performed on the percentage of overall achieved goals, which explained a key impact of group and an association of session and group. In initial testing sessions, participants who received augmentative visual input outperformed those who only received auditory feedback. After three days of instruction, augmentative visual feedback has little impact on individual training and generalization output as compared to auditory feedback alone.

Appelbaum & Erickson, (2016) research article was based on digital training techniques for sports vision training. They explained that for performing at top level in sports its needs excellent vision, they also added that many athletes are including vision training in their training plan. As the training of sports vision is increasing its needs tuff challenges of visual perception, oculomotor, and cognitive task, which helps in vision process and response and finally improves sports performance. Training of vision is not new, but through new digital technology it has got innovation and handy during the normal training

plan, by training plan related to perceptual- learning. Sporting settings can recreate and improves through reality imitations practical plan that boost specific cognitive and visual abilities. By improving these specific visual abilities, we have a greater advantage while competing in play field. This article explains sports vision training new evolving method, trends, and technologies.

Badami et al., (2016) conducted a study on effect of sports vision exercises on fundamental motor skills and cognitive skills of 7- to 10-year-old developmental dyslexic Persian children. A pretest-posttest quasi-experimental study was conducted. A total of 22 (Twenty-two) sample, 7- to 10-year-old dyslexic children from two centers of learning disorder in the city of Isfahan selected for the study. And randomly assigned into experimental and control group. The experimental group participated in sports vision exercise courses for 12 weeks (3 one hr. sessions per week) and control group performs their daily routine. Pre-test and post-test completed through Gardner's test of visual perception test - revised and Dakoda's reading skills test on both the groups. The results show a significant improvement through the sports vision exercises on motor skills, visual perceptual skills and reading skills in developmental dyslexic children. The results of the study concludes that sports vision exercises can be used for fundamental and cognitive skills development of developmental dyslexic children.

Wilkins & Appelbaum, (2019) research study was based on the impact of stroboscopic visual training. Motion perception, visual attention and catching performance were selected as a dependent variable for the study. A total of thirty (18 men and 12 women) with age (mean 22.5, SD-4.7) were selected as participants for the study. The stroboscopic training programme includes two different training plans i.e. first, systematically increasing of off-time glass and second, where glasses always set at the minimum off-time. The first group called as a variable strobe rate group (VSR) and second was known as constant strobe rate group (CSR). Training plan includes a six-week simple tennis ball-catching drills (9 × 20 min.). The participants follow pre- and post-training tests, which consist of Useful Field of View (UFOV), one-handed ball-catching task and Motion in Depth Sensitivity (MIDS. For constant strobe rate group (CSR), no effect was on catching performance, but it was predicted that variable strobe rate group (VSR) show significantly greater progress from pre- to post-training. In any of the test CSR and VSR showed no significant differences. But a significantly pre–post training correlation was found between catching performance changes (total balls caught) and UFOV single-task changing in scores and for MIDS tests. But irrespective to their group, participant who significantly

improved their post-test perceptual-cognitive performance, their catching performance was also improved. This study showed linked between stroboscopic training and sports skill performance.

Lahiri & Thander, (2020) research study was based on different types of visual training plans impact on elite cricket players. A total of 24 (Twenty-four) male county cricket players were selected as a sample for the study. Further the selected sample were randomly allocated into four groups and they went through visual training programme of six-week comprising of online training (O), Nintendo Wii games (W), practical drills (P), or a control intervention (C). Pre and posttest were conducted on 7 cricket and 14 visual ability tasks. Analysis showed pre- to post-test significant improvement in all experimental groups, whereas no significant improvement was shown for C group. So, visual and cricket skills were improved by the three vision training methods, when compare with control intervention. This study supports the improvement of visual skills through visual training. The cricket skills improvement also recommends enhancements in 'on-field' performance through visual skills influence.

3. DESCRIPTION OF BROAD AREA

The broad area of this study is to use visual training approaches to improve performance-related skills in hockey, a game that needs quick reflexes, precise judgement, and coordinated motor actions. As competitive team sports evolve, athletes must now excel in physical conditioning, technical proficiency, and perceptual and cognitive skills. Visual and perceptual training has emerged as a vital, though often ignored, area within the broader framework of sports performance improvement.

Hockey is a sport that requires considerable demands on a player's response time, spatial awareness, coordination, and anticipation. The game's high tempo, coupled with the small size of the ball and restricted playing space, requires players to rapidly interpret visual data and convert it into accurate motor actions. However, visual skills are often overlooked in traditional sports training, which primarily emphasizes physical conditioning and technical skill. This leads to a weakness in athlete preparation, especially for emerging players who are still refining their game intelligence and response timing.

This study investigates the impact of diverse visual training programs—comprising field-based practical exercises, laboratory-based techniques, and hybrid methodologies—on critical visual-coordinative ability:

Hand-eye coordination is essential for ball control, passing, and stickhandling while moving or in a stationary position.
Foot-eye coordination is the ability to control and direct foot movements in response to visual stimuli.
Visual reaction time is crucial for swift responses to different gaming situations.
Peripheral vision awareness of opponents and teammates outside of direct line of sight during play.
Time-movement anticipation enhances the ability to accurately predict the timing and trajectory of fast-paced game actions.

Each of these criteria is crucial to the performance of hockey players. Enhancing them can improve games performance and improve players' confidence, calmness, and tactical awareness on the field. These increases are especially crucial for athletes in formative or early competitive stages, as establishing effective visual-motor patterns might provide lasting benefits.

This research is important because of its possible influence on athlete training methods. Incorporating visual training into conventional sports conditioning programs allows coaches and trainers to offer a more holistic development framework. This strategy recognizes that optimal performance depends not just on muscular strength or endurance but also on the velocity and accuracy with which a player can perceive, decide, and execute actions. Moreover, improved visual awareness and coordination might lead to a decrease in injuries, as players become more proficient at anticipating dangerous circumstances or avoiding accidents.

This research aligns with current advances in sports science and applied performance training, progressing towards multi-dimensional models of athlete development. There is increasing interest in the interplay among perception, cognition, and movement in high-performance settings. This work contributes to the discourse by offering practical, evidence-based insights on employing vision-focused training to improve on-field abilities and cognitive processing.

The findings of this study may extend beyond the domain of hockey. Other team sports, such as football, basketball, and combat sports, demonstrate similar demands in visual perception, response time, and movement anticipation. Thus, the results of this study may guide standardized visual training programs beneficial to athletes across multiple disciplines.

4. RESEARCH OBJECTIVES

The study's objectives have been established by the problem statement that was the basis for the investigation:

1. To examine the effect of different visual training programs on the eye-hand coordination of male hockey players.
2. To examine the effect of different visual training programs on the eye-foot coordination of male hockey players.
3. To examine the effect of different visual training programs on the visual reaction time of male hockey players.
4. To examine the effects of different visual training programs on the peripheral awareness of male hockey players.
5. To examine the effects of different visual training programs on the time-movement anticipation of male hockey players.

5. RESEARCH METHODOLOGY

5.1. Selection of Variables

The research scholar reviewed the various scientific literatures pertaining to visual training on selected variables books, journals, periodicals, and research papers. Taking into consideration of feasibility criteria availability of instruments and the relevance of the variables of the present study, the following variables were selected.:

Variable-

1. **Independent Variable**

a) Different visual training programmes

2. **Dependent Variable**

a) Eye-hand coordination

b) Eye-foot coordination

c) Reaction time

d) Peripheral awareness

e) Time movement anticipation

5.2. Administration of test

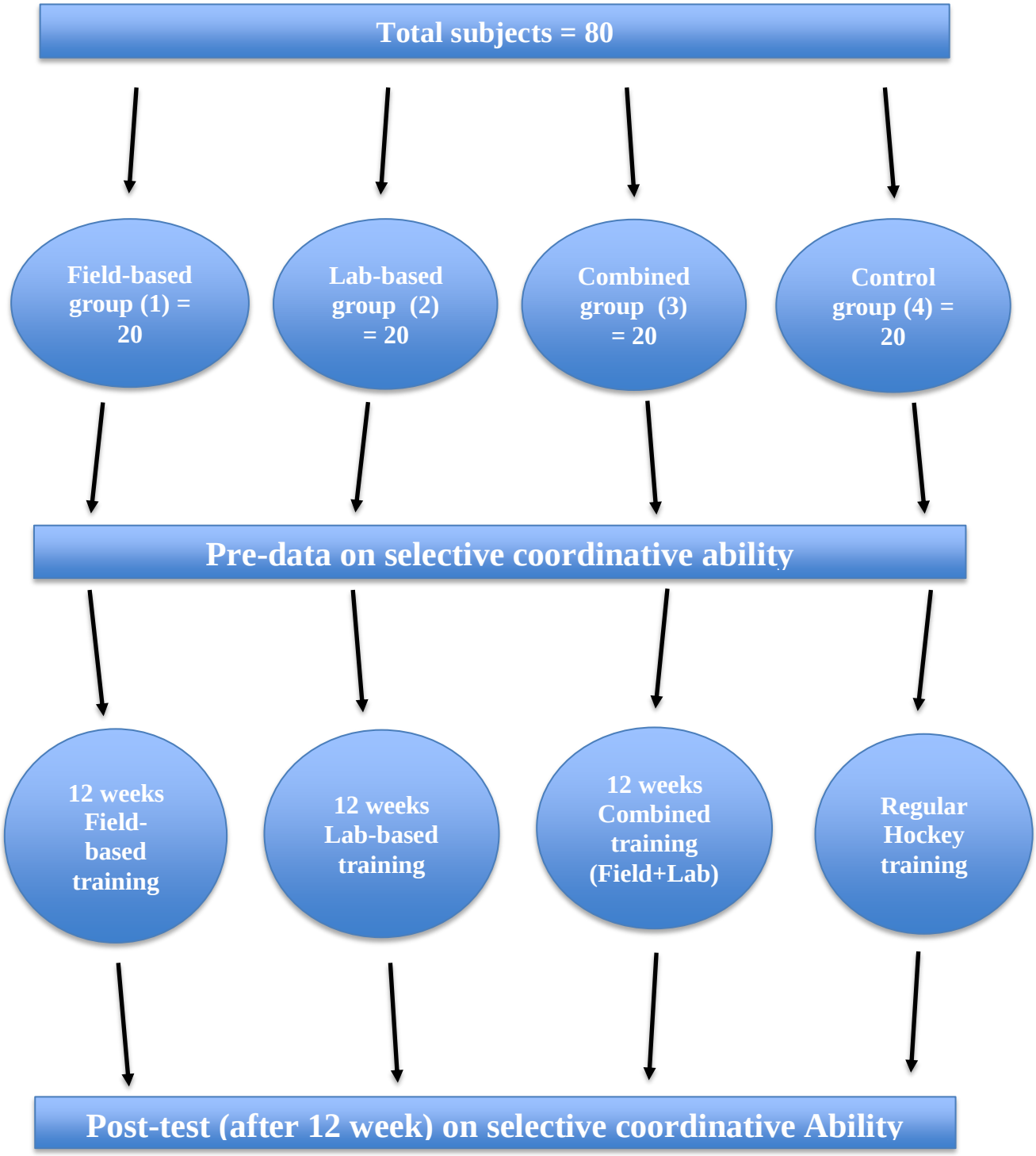
The selected variables will be tested by using the following standardized tests items.

Eye-Hand Coordination: Alternate Wall Pass Test developed by Mackenzie. (Mackenzie, sports coach, 2009)
Eye- Foot coordination: Eye Foot Coordination Test by kansal (Kansal, 2008)

Visual Reaction Time: Ruler Drop Test developed by Mackenzie. (Mackenzie, sports coach, 2004)
Peripheral awareness: Vision Protractor Test by (Amrutha Raj, 2015)
Time Movement Anticipation: The Bassin Anticipation Timer was developed by Dr. Stanley Bassin at California State Polytechnic University, Pomona.

5.3. Research Design

This study utilizes a pre-test-post-test experimental design with four groups to assess the effects of different visual training programmes in male hockey players. The four groups are as follows: Group 1 (Field-based training group), Group 2 (Lab-based training group), Group 3 (Combined Field and Lab-based training group), and Group 4 (Control group with no intervention). A purposive sampling technique will be used to recruit 80 participants (20 per group), ensuring a balanced representation of male hockey players, aged 16–25, with minimum 3 years of playing experience. The interventions will be conducted over a period of 12 weeks. Random allocation within the sample will be applied to control biases and ensure comparable baseline characteristics. This design enables a clear comparison of the effects of each intervention on the selected variables.


Total subjects = 80
Field-based group (1) = 20
Lab-based group (2) = 20
Combined group (3) = 20
Control group (4) = 20
Pre-data on selective coordinative ability
12 weeks Field-based training
12 weeks Lab-based training
12 weeks Combined training (Field+Lab)
Regular Hockey training
Post-test (after 12 week) on selective coordinative Ability

Flowchart of Experiment Design

5.4. Data Sources and Evaluation Methods

Primary Source

The primary data will be collected directly from 80 male hockey players in the Gwalior district. These participants will be evaluated before and after 12-week visual training program using standardized tools and protocols. The data will focus on selected coordinative variables. All measurements will be taken under controlled conditions to ensure accuracy and consistency.

Secondary Source

Secondary sources will include scholarly journals, peer-reviewed articles, books, dissertations, and existing research studies related to visual training, physical education, sports psychology, and sports sciences. These sources will be used to support the rationale for selecting specific variables, designing interventions, and understanding the theoretical background and previous research findings relevant to the current study.

Evaluation Method

To analyse the data, the Kolmogorov-Smirnov test will be used to check the normality of the data distribution. Descriptive statistics such as mean and standard deviation will summarize the central tendency and variability of the scores. For comparing the effectiveness of the interventions while controlling for pre-test differences, Univariate Analysis of Covariance (ANCOVA) will be employed. The level of significance will be set at 0.05.

6. EXPECTED OUTCOME

The purpose of this study is to investigate how various visual training programs affect male hockey players' selected coordination skills. Visual training, which includes both lab-based and field-based programs, is expected to greatly improve the players' coordination skills. Through the incorporation of this type of visual training into their daily practice regimens, players may see a notable improvement in their athletic performance. The results may aid in the formulation of more efficient, comprehensive training methodologies in hockey.

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